REMARKS

Summary of the Office Action

Claims 1-6, 30-38, and 40-47 are pending in the above-identified patent application. Of those, claims 1-6 and 30 have been withdrawn from further consideration as being drawn to a non-elected invention.

The Examiner has requested certified copies of priority Australian Application Nos. PR 5540 and PR 5541 and a copy of International Application No. PCT/AU02/00747.[2]

Claims 45 and 46 have been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Claim 42 has been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

Claims 31-33, 35, and 38 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,841,688 to Rinaldi ("Rinaldi"). Claims 31-38 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 3,866,364 to Pollard ("Pollard"). Claims 31-36 and 38 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,388,786 to Gassler ("Gassler"). Claims 40-44 and 47 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 3,053,353 to Miller ("Miller").

Claims 31-38, 40-44, and 47 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,996,299 to Hsueh ("Hsueh") in view of International Publication No. WO 95/27834 to Mamane ("Mamane").

[2] On November 29, 2005, the undersigned called the Examiner regarding the request in the Office Action for a "certified cop[y]" of the international application. Office Action, p. 2, ¶ 1. The Examiner clarified that only a copy of the international patent application, and not a "certified cop[y]," needs to be submitted by applicants.

Summary of Applicants' Reply

Applicants have amended claim 31 to more particularly define the present invention. In connection with the amendment of claim 31, applicants have canceled dependent claim 32 without prejudice. Applicants have amended claim 42 to correct an inadvertent error in the claim. Applicants have canceled claim 45 without prejudice, and have amended the dependency of claim 46 in light of the cancellation of claim 45.

Applicants are submitting herewith copies of priority Australian Application Nos. PR 5540 and PR 5541 and a copy of International Application No. PCT/AU02/00747.

Applicants are also submitting herewith a Supplemental Information Disclosure Statement and a petition for a one-month extension of time.

The Examiner's claim rejections are respectfully traversed.

The Section 112, First Paragraph Rejection

Claims 45 and 46 have been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. In particular, the Examiner contends that "the newly amended features of 'the joining clip is made of a rigid material' (claim 45) and 'of a [sic] stainless steel' (claim 46) were not supported by the disclosure as original filed," referring to page 7, lines 23-24 of applicants' specification. Office Action, p. 3, ¶ 3.

Applicants have canceled claim 45 without prejudice, and have amended claim 46 to be dependent from claim 40. Thus, claim 40 recites that "the co-operating means [of the joining clip] including a pair of resilient arms," and claim 46 further recites that "the joining clip is made of stainless steel."

Amended claim 46 is clearly supported by applicants' specification as originally filed. For example, as set forth in applicants' specification, "[i]nstead of being constructed from

relatively flexible material, such as plastic polymers, one or both parts of the joining clip may be made from more rigid material, especially for external use. For example, stainless steel may be used." Patent Publication, ¶ [0025]. Thus, the recitation in claim 46 that the joining clip be made of stainless steel is supported by applicants' specification, and therefore the Examiner's objection to claim 46 under 35 U.S.C. § 112, first paragraph, should be withdrawn.

It should be noted that the feature recited in claim 46, that "the joining clip is made of stainless steel," is not contradictory to the feature recited in claim 40, that "the co-operating means includ[es] a pair of resilient arms." In particular, to be "resilient" means "characterized or marked by resilience: as **a:** capable of withstanding shock without permanent deformation or rupture." Merriam-Webster Online Dictionary. Thus, a joining clip made of stainless steel, as recited in claim 46, can also be resilient.

The Section 112, Second Paragraph Rejection

Claim 42 has been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. In particular, the Examiner contends that applicants' specification sets forth that the "first part" of the joining clip has the protrusion adapted to snap into a channel on the "second part." Office Action, p. 3, ¶ 5.

Applicants submit that the recitation in claim 42 of the second part having the protrusion was an inadvertent error. Applicants have amended the claim to recite that "the first part has a protrusion adapted to snap into or slide into a channel on the second part," and therefore the Examiner's rejection of the claim under 35 U.S.C. § 112, second paragraph, should be withdrawn.

The Section 102 Rejections

Applicants' amended claim 31 is directed toward a building element suitable for use as a stud or mullion. The building element of claim 31 includes a first set of three channels spaced from a second set of three channels by first and second webs. Each channel in the first set of channels has a base between a pair of parallel sides, which sides are also parallel to the sides of the other channels in the first set. The bases of the channels in the first set of channels are aligned.

The Examiner has rejected independent claim 31 as being anticipated by Rinaldi, Pollard, and Gassler. The Examiner has also rejected dependent claim 40 as being anticipated by Miller. Applicants submit that claim 40 is dependent from independent claim 31, and therefore Miller must show or suggest all the features of applicants' claim 31, in addition to those of claim 40, in order for the anticipation rejection to be proper. In rejecting claim 40, the Examiner has failed to refer to portions of Miller as disclosing the features of applicants' claim 31. Rather, the Examiner has only referred to portions of Miller as allegedly disclosing the features of applicants' claim 40. While applicants submit that the anticipation rejection of claim 40 is therefore improper, applicants will additionally address Miller in connection with the section 102 rejections of claim 31 to facilitate prosecution.

Also in connection with the section 102 rejections of independent claim 31, the Examiner has variously recited features found in dependent claim 40. Applicants again respectfully submit that claim 40 is dependent from claim 31, and therefore applicants' independent claim 31 does not recite those features set forth in claim 40.

The Examiner's rejections of claim 31 under section 102 are respectfully traversed.

Rinaldi

Rinaldi discloses a modular pavilion that is constructed of modular elements, each element having a pair of channels along opposite sides of the element for receiving internal and external canvases. Rinaldi, Abstract. As shown in FIG. 5 of Rinaldi, modular element 6 includes channels 7 and 8 and a connecting area 24 between the channels.

In contrast to applicants' amended claim 31, however, channels 7 and 8 and connecting area 24 of Rinaldi do not have "a base between a pair of parallel sides, which sides are parallel to the sides of the other channels in the first set." Rather, as shown in FIG. 5 of Rinaldi, channels 7 and 8 are curved, and therefore do not even include a "base" and "sides." Further, because channels 7 and 8 of Rinaldi do not include "bases" as recited in claim 31, it follows that Rinaldi does not show or suggest "bases of the channels in the first set of channels being aligned."

Accordingly, for at least these reasons, Rinaldi fails to show or suggest all the features of applicants' amended claim 31, and therefore the rejection of the claim under section 102 should be withdrawn. In addition, dependent claims 33, 35, and 38 are allowable at least because independent claim 31 is allowable. Thus, the Examiner's rejections of dependent claims 33, 35, and 38 are moot and should also be withdrawn.

Pollard

Pollard discloses a modular structure that is constructed of extruded elongate structural members. Pollard, Abstract. As shown in FIGS. 1 and 2 of Pollard, elongate member 11 includes grooves 19, 12, and 22, and grooves 21, 14, and 23.

In contrast to applicants' amended claim 31, however, Pollard does not show or suggest "a first set of three channels and a second set of three channels," where "each channel in the first set of channels [has] a base between a pair of parallel sides, which sides are parallel to the sides

of the other channels in the first set." Rather, as shown in FIGS. 1 and 2 of Pollard, grooves 12 and 14 are curved, and therefore do not even include a "base" and "sides." Further, because grooves 12 and 14 of Pollard do not include "bases" as recited in claim 31, it follows that Pollard does not show or suggest "bases of the channels in the first set of channels being aligned."

Accordingly, for at least these reasons, Pollard fails to show or suggest all the features of applicants' amended claim 31, and therefore the rejection of the claim under section 102 should be withdrawn. In addition, dependent claims 33-38 are allowable at least because independent claim 31 is allowable. Thus, the Examiner's rejections of dependent claims 33-38 are moot and should also be withdrawn.

Gassler

Gassler discloses construction means for wall and/or roof structures that include wall and/or roof supports 13, 14. Gassler, Abstract. As shown in the various embodiments, supports 13, 14 of Gassler include webs 11 forming mortise-shaped pockets 12.

In contrast to applicants' amended claim 31, however, pockets 12 of Gassler do not have "a base between a pair of parallel sides, which sides are parallel to the sides of the other channels in the first set." Rather, as shown in the various embodiments of Gassler, the webs 11 that form the sides of each pocket 12 are not parallel to the webs that form other pockets of support 13, 14.

Accordingly, for at least this reason, Gassler fails to show or suggest all the features of applicants' amended claim 31, and therefore the rejection of the claim under section 102 should be withdrawn. In addition, dependent claims 33-36 and 38 are allowable at least because independent claim 31 is allowable. Thus, the Examiner's rejections of dependent claims 33-36 and 38 are moot and should also be withdrawn.

Miller

Miller discloses a frame for supporting a curtain wall structure, the frame including vertical frame members 16. Miller, col. 2, ll. 46-49. As shown in FIG. 4, frame members 16 include three channels formed by base 44 and sides 46, 54, 56, and 48.

In contrast to applicants' amended claim 31, however, frame members 16 do not include a first set of three channels and a second set of three channels. Rather, frame members 16 include only one set of channels.

Accordingly, for at least this reason, Miller fails to show or suggest all the features of applicants' amended claim 31, and therefore claim 31 is not anticipated by Miller. It follows that dependent claims 40-44 and 47, which depend from independent claim 31, are also not anticipated by Miller at least because independent claim 31 is not. Thus, the Examiner's rejections of dependent claims 40-44 and 47 are moot and should be withdrawn.

The Section 103 Rejections

Independent Claim 31

The Examiner has rejected claim 31 under section 103 as being unpatentable over the combination of Hsueh with Mamane. Applicants respectfully disagree, and submit that the combination of Hsueh with Mamane does not show or suggest all the features of applicants' amended claim 31.

Hsueh, as shown in FIG. 1, discloses skeletal material 1 having frames 14 for engaging a hold-down strip 4. In contrast to applicants' amended claim 31, however, skeletal material 1 does not include a first set of three channels and a second set of three channels. Rather, skeletal material 1 only includes two frames 14 on each end of skeletal beam 11. *See* FIG. 1 of Hsueh, reproduced below for reference.

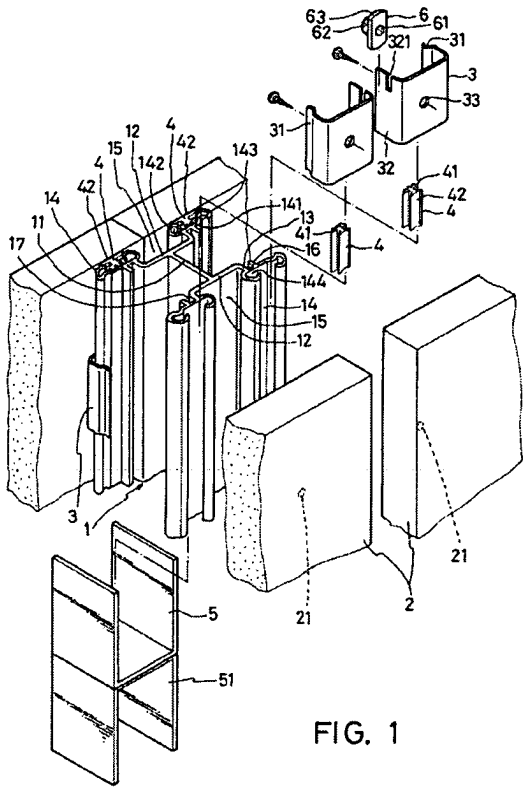

FIG. 1

Further, frames 14 of Hsueh do not have "a base between a pair of parallel sides, which sides are parallel to the sides of the other channels in the first set." Rather, as shown in FIG. 1 of Hsueh, frames 14 have curved sides, and therefore the sides are not "parallel" as recited by claim 31. Furthermore, the addition of Mamane fails to remedy the shortcomings of Hsueh. Thus, the combination of Hsueh with Mamane does not show or suggest all the features of applicants' amended claim 31, and the rejection of the claim under section 103 should be withdrawn.

Additionally, the Examiner has failed to provide a proper motivation for combining Hsueh with Mamane. In particular, the Examiner asserts that:

> Mamane is used as a teaching reference to teach a building element would provide more than one webs to form a tubular space therebetween to receive a fastener (i.e. 6) without penetrating the webs to maintain the strength of the building element *as solve the same problem as the claimed invention as disclosed in the specification.* Since the references in the same art, it would have been obvious to one ordinary skill in the art to modify the building element of Hsueh with more than one web as taught by Mamane *to achieve the improvement for such application as claimed invention.*

Office Action, p. 9, ¶ 12 (emphasis added). Thus, the Examiner asserts that the problem disclosed in *applicants' specification* can be resolved by combining Hsueh with Mamane, thereby achieving the improvement of *applicants' claims*. In doing so, the Examiner is deriving the motivation to combine Hsueh with Mamane from applicants' specification and claims. This is improper: "[t]he motivation to combine references can not come from the invention itself." *Heidelberger Druckmaschinen AG v. Hantscho Commercial Products, Inc.*, 21 F.3d 1068, 1072 (Fed. Cir. 1993).

Thus, for at least these reasons, applicants' amended claim 31 is patentable over the combination of Hsueh with Mamane, and the Examiner's rejection of the claim under section 103 should be withdrawn. In addition, dependent claims 33-38, 40-44, and 47 are allowable at least because independent claim 31 is allowable. Thus, the Examiner's rejections of dependent claims 33-38, 40-44, and 47 are moot and should also be withdrawn.

Dependent Claim 40

Applicants' claim 40 depends from independent claim 31, and therefore is allowable over the cited references for at least the reasons set forth above in connection with claim 31.

In addition, and as set forth in applicants' Reply to Office Action filed June 30, 2005, the combination of Hsueh with Mamane also fails to show or suggest the feature of "a joining clip adapted to mount a panel or bracket to the building element of claim 31."

The Examiner asserts that Hsueh discloses the joining clip of applicants' dependent claim 40:

> a joining clip having two separated parts (4, 3), the first longitudinally extending part (3) including a pair of resilient arms (31) being snap engaged with the channel (14) of the building element, and having a base receiving bolts passed therethrough holes (33, 21) for providing means to connect the joining clip to a panel (2), and the second longitudinally extending part (4) having a pair of resilient arms (41) being snap into the channel (14) of the building element for providing co-operating means and having a

protrusion (42) being inserted into the channel of the first longitudinal extension part (3) to receive fasteners (21) passed therethrough for providing means connecting the panel (2) to the building element (1).

Office Action, p. 7, ¶ 10. Applicants respectfully disagree, and submit that the parts of Hsueh that the Examiner alleges to be the first and second parts of applicants' claim 40 -- fastening plate 3 and hold-down strip 4 -- are not "adapted to mate" as required by applicants' claim 40. In particular, hold-down strip 4 merely lies flat along the portion of fastening plate 3 that the strip touches, as shown in FIG. 3 of Hsueh. In fact, without the screw that holds strip 4 to partition 2 (as shown extending through locking holes 21), plate 3 and strip 4 would not even be positioned together. In other words, plate 3 and strip 4 are not "adapted to mate," as such adaptation would require some joining between the parts other than the hold-down strip merely being positioned next to the fastening plate.

Accordingly, for at least this additional reason, applicants' dependent claim 40 is patentable over Hsueh in view of Mamane, and the Examiner's rejection of the claim should be withdrawn.

Conclusion

Applicants respectfully submit that, as described above, the cited prior art does not show or suggest the combination of features recited in the claims. Applicants do not concede that the cited prior art shows any of the elements recited in the claims. However, applicants have provided specific examples of elements in the claims that are clearly not present in the cited prior art.

Applicants strongly emphasize that one reviewing the prosecution history should not interpret any of the examples applicants have described herein in connection with distinguishing over the prior art as limiting to those specific features in isolation. Rather, applicants assert that

it is the combination of elements recited in each of the claims, when each claim is interpreted as a whole, which is patentable. Applicants have emphasized certain features in the claims as clearly not present in the cited references, as discussed above. However, applicants do not concede that other features in the claims are found in the prior art. Rather, for the sake of simplicity, applicants are providing examples of why the claims described above are distinguishable over the cited prior art.

Applicants wish to clarify for the record, if necessary, that the claims have been amended to expedite prosecution. Moreover, applicants reserve the right to pursue the original subject matter recited in the present claims in a continuation application.

Any narrowing amendments made to the claims in the present Reply are not to be construed as a surrender of any subject matter between the original claims and the present claims; rather merely applicants' best attempt at providing one or more definitions of what applicants believe to be suitable patent protection. In addition, the present claims provide the intended scope of protection that applicants are seeking for this application. Therefore, no estoppel should be presumed, and applicants' claims are intended to include a scope of protection under the Doctrine of Equivalents.

Further, applicants hereby retract any arguments and/or statements made during prosecution that were rejected by the Examiner during prosecution and/or that were unnecessary to obtain allowance, and only maintain the arguments that persuaded the Examiner with respect to the allowability of the patent claims, as one of ordinary skill would understand from a review of the prosecution history. That is, applicants specifically retract statements that one of ordinary skill would recognize from reading the file history were not necessary, not used and/or were rejected by the Examiner in allowing the patent application.

For all the reasons advanced above, applicants respectfully submit that the rejections have been overcome and should be withdrawn.

For all the reasons advanced above, applicants respectfully submit that the application is in condition for allowance, and that such action is earnestly solicited.

Authorization

The Director is hereby authorized to charge any additional fees which may be required for this Reply, or credit any overpayment, to Deposit Account No. 08-0219.

In the event that an extension of time is required, or which may be required in addition to that requested in a petition for an extension of time, the Director is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. 08-0219.

Respectfully submitted,
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Date: 1/17/06

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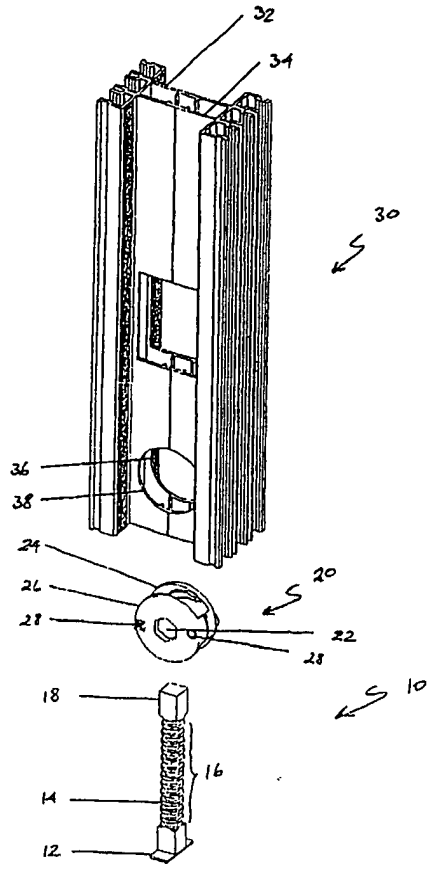
(54) Title: ADJUSTMENT DEVICE AND BUILDING ELEMENT



(57) Abstract: There is provided an adjustment device for adjusting the vertical height of, for example, studs, furniture and large appliances. The device has a base (12), a pin (14) upstanding from and supported by the base and a rotatable cam element (20). The pin has a number of grooves (16) and the cam is capable of engaging one or more of the grooves to alter the distance between the base and cam. Also disclosed is a stud or mullion (30) having two sets of channels, each of which is adapted to receive a cooperating means for mounting a panel or bracket. The sets of channels are parallel to each other and spaced apart by parallel spaced webs (32, 34). The adjustment device may be inserted in the stud or mullion. Further disclosed is a joining clip (not illustrated) for mounting a panel or bracket to the stud or mullion. The clip is in two parts, one part has means to connect the clip to the panel and the other has a pair of resilient arms and is able to mate with the first part.

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(84) **Designated States** *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Title

Adjustment Device and Building Element

Technical Field

This invention relates to an adjustment device which is particularly useful in adjusting the vertical height of studs and the like in construction. While, for convenience, the invention will frequently be described below in this connection, it is to be understood that the invention is not limited in this way. The invention has broader application and can be used, for example, in connection with furniture assembly and as a levelling device for restaurant tables, refrigerators, washing machines, etc. Other applications are possible.

This invention also relates to improved building elements useful in connection with the construction industry. The invention is applicable to the building of both internal walls and partitions and external walls, especially cladding. However, it is to be understood that the invention is not necessarily limited to these applications.

Background Art

In relation to the first aspect, in the construction industry, as well as in many other applications, it is desirable to provide adjustment up to a maximum of about 6-7mm. It is an aim of the present invention to provide a device which permits that quantum of adjustment, and which may also be useful, at least in some embodiments, to effect far more extreme adjustments, for example, of 50mm or more.

It is also desirable to provide an adjustment device which can provide tension as well as or as an alternative to compression. In other words, it is desirable that the device be able to "pull" as well as "push". It is an aim of the present invention to provide such a device, at least in some embodiments.

In a second aspect, the invention represents an advance on the invention disclosed in international patent application No. PCT/AU97/00681 ("the PCT Application"), the contents of which are imported herein by reference.

The PCT Application disclosed a building element being a stud. The stud had a first set of channels and a second set of channels. Each channel in each set was adapted to receive a co-operating means for the purpose of mounting a panel or bracket on the stud. The first set of channels was parallel to and spaced from the second set of channels.

While the number of channels was not limited as to number, there were preferably three in each set. It was also preferred that the first set of channels was spaced from the second set of channels by a single web and this was illustrated in Figures 1 to 3, 6, 8, 10 and 12 to 20 of the drawings.

The PCT Application also disclosed a building element being a joining clip. The joining clip was adapted to mount a panel or bracket to the stud also disclosed in the PCT Application. The joining clip included the co-operating means (to be received in each channel of each set of the stud). The joining clip also included means for connecting the joining clip to the panel or bracket. The co-operating means included a pair of resilient arms.

Disclosure of the Invention

In the first aspect, this invention provides an adjustment device which includes:

a base;

a pin upstanding from the base and being supported by the base, the pin having a plurality of grooves; and

a rotatable cam element capable of engaging one or more of the grooves to alter the distance between the base and the cam element.

Preferably, the adjustment device includes means, such as a spring, for biasing the cam element in relation to the base. Preferably, the bias is away from the base. The adjustment device also may include means for locking the cam element in place once the desired distance between the base and the cam element has been achieved. The adjustment device may be designed to urge the cam element away from the base if the cam element is unlocked, through the influence of the biasing means. Depending on the length of the pin and the chosen location of the grooves, the adjustment device may be capable of adjustment to any desired extent.

The adjustment device of the invention is particularly suitable for insertion in a stud or other building element, so that the vertical alignment of the stud can be adjusted by means of the adjusting device. In this situation, the cam element is preferably inserted in a web of the stud, with the base supporting the stud on the floor of the building structure. Rotation of the cam element can enable the height of the stud to be adjusted upwardly or downwardly as desired. The adjustment device of the invention is preferably suitable for insertion in the building element of the second aspect of the invention.

In relation to the second aspect of the invention, it has now been found that the stud of the PCT Application can be produced in an improved form if the first set of channels is spaced from the second set of channels by first and second webs, being spaced from each other.

It has also been found that a modification of the stud can be produced to form a mullion which is particularly useful for external walls, especially in connection with glazed or cladding panels.

Accordingly, in a second aspect the present invention provides a building element suitable for use as a stud or mullion, the building element having a first set of channels and a second set of channels, each channel in each set being adapted to receive a co-operating means for the purpose of mounting a panel or bracket on the

building element, the first set of channels being parallel to and spaced from the second set of channels, characterised in that the first set of channels is spaced from the second set of channels by first and second webs, the first web being parallel to and spaced from the second web.

The co-operating means may include a pair of resilient arms as disclosed in the PCT Application. Alternately or in addition the co-operating means may include a fastener capable of operating by remote activation as disclosed in International Patent Application No. PCT/AU99/00185, the contents of which are imported herein by reference.

It has now been found possible to devise a way of making the clip disclosed in the PCT Application in more than one part. This is particularly useful because one part of the joining clip can be attached to the panel or bracket in the factory and the other part of the clip, which includes the co-operating means, can be transported separately from the panels and attached thereto on site. This can avoid any problem arising from damage to the co-operating means during transport.

Another useful feature of the new clip, in some embodiments, is the dimensional tolerance it allows in respect of alignment of the panel or bracket with the stud or mullion.

Accordingly, this invention provides, in a third aspect, a building element being a joining clip adapted to mount a panel or bracket to the stud or mullion referred to above, the joining clip including the co-operating means and also including means for connecting the joining clip to the panel or bracket, the co-operating means including a pair of resilient arms, characterised in that the joining clip has a first part which includes the means for connecting the joining clip to the panel or bracket and a second part which includes the pair of resilient arms, the first part being adapted to mate with the second part.

Preferably, the first part permits simple attachment to the panel or bracket, for example, by adhesion, nailing or screwing. The first part may mate with the second part in any suitable way. Preferably, the first part has a protrusion adapted to snap into or slide into a channel on the second part. Of course, this arrangement may be reversed so that the second part has a protrusion adapted to snap into or slide into a channel on the first part. Other arrangements may be possible.

The first part may be regarded as a clip carrier, while the second part may be regarded as the clip. These terms will be used in relation to a preferred embodiment described in the attached drawings. It is also preferred that both the first and second parts are made of relatively resilient material, to assist in mating one with the other and also to provide flexibility for variation in site dimensions. The material of the joining clip may also be able to cope with expansion and contraction in situ.

The joining clip may be suitably designed so that it can also function as an internal drain in the panel assembly. It may, instead or in addition, form a seal for the panel assembly.

Instead of being constructed from relatively flexible material, such as plastic polymers, one or both parts of the joining clip may be made from more rigid material, especially for external use. For example, stainless steel may be used.

As indicated above, it is contemplated that the clip carrier may be attached to the panel in the factory. It is contemplated that the clip may be installed on site and the clip carrier attached to the clip on site. It is preferred that the mating between the first and second parts takes place by pushing the parts together and by pushing the second part into an appropriate channel in the stud or mullion. However, if desired, the first and second parts may be mated by sliding one or part of one into the other.

As mentioned above, grooves may be formed in the stud or mullion of the invention. Conveniently, at least some of these grooves may be made in channel

walls. Complementary grooves may be formed on the resilient arms on the joining clip and may assist in locking the joining clip into a chosen channel, at least until it is desired to disengage the joining clip from the channel.

As will be apparent to one skilled in the art, it may be possible, using the joining clip and stud or mullion of the invention, to forward fix a panel to a stud or mullion. It is also to be appreciated that the stud or mullion of the present invention may be used with the joining clip of the PCT Application, and that the joining clip of the present application may be used with the stud of the PCT Application, in each case with appropriate adjustments if necessary.

It is contemplated that the stud or mullion of the invention may include means allowing it to be adjusted vertically in situ.

The invention also provides the adjustment device of the invention combined with the building element of the invention, being the stud or mullion. The adjustment device of the invention is preferably inserted into the building element of the second aspect of the invention.

In relation to the building element of the second aspect of the invention, each channel in each set has a base and in some applications it is useful to be able to screw through or otherwise penetrate the base. The use of two webs, spaced one from the other, can enable screws or other penetrating articles to be inserted through the base of a channel between the first and second webs, without affecting the strength of either web. This can be contrasted with the situation shown in Figure 1 of the PCT Application, for example. If it was desired to screw through the centre of base 13 of central channel 12 in Figure 1 of the PCT Application, the screw would penetrate web 11, affecting its integrity and possibly weakening the stud. That problem can be avoided by use of the building element of the present invention.

When the building element of the present invention is to be used as a stud, it is preferred that the first and second webs are located close to a centre line for the building element, the centre line extending from the centre of the first set of channels through the centre of the second set of channels. However, the building element of the invention may also be used as a mullion, in which case it is preferred that the first and second webs are located as far from the centre line as possible.

The stud or mullion of the present invention may be made of any suitable material but is preferably steel or aluminium. If desired, the stud or mullion of the present invention may be grooved, either to reduce mass or to enhance reception and retention of the co-operating means, or both. Preferred embodiments of these aspects are shown in connection with the attached drawings.

The use of first and second webs can also serve to strengthen the stud or mullion and enable lighter or thinner material to be used in its construction while reducing the likelihood of twisting.

When the building element of the present invention is to be used as a mullion, it may be convenient if the form of one set of channels is different from the form of the other set of channels. Use of the mullion of the invention can provide a system of providing external cladding or facades to buildings with hidden framing. The framing can accept glass or cladding panels and can enable simplified fitting of such panels. The mullion can also provide draining for the facade. One set of channels can accommodate the glass or cladding panels, while the other can accommodate internal linings for the building structure.

Especially when the building element of the invention is to be used as a mullion, it may have a first arm and a second arm, the first arm being at an angle to the second, each arm having two or more channels set side by side.

In addition to the first and second arms, the building element in this aspect of the invention may have third, or third and fourth, arms or even more. The angle between the first and second arms is preferably 90° but other angles are not excluded. When there are two arms, the element is preferably of an "L-shape". When there are three arms, the element preferably forms a "T-shape". The four-armed form of the element is preferably a cruciform shape.

The arms may lie in a single plane or may lie in two or three planes.

Preferably, there are three channels in each arm. The junction between the respective channels where the arms "meet" can take any desired conformation, especially having regard to the desirability to enable the building element in this aspect of the invention to provide drainage.

If desired, the building element of this aspect of the invention may be formed so that it has a mirror image, joined by the two webs, each arm resembling the stud of the second aspect of the invention.

In connection with the first aspect of the invention, being the adjustment device, the cam element can be designed so that a stud or other element with the adjustment device attached can be raised or lowered without the requirement to cause the full length of the pin to travel through the cam element.

The pin in the adjustment device of the invention may be of any desired length. Although it is anticipated that the adjustment device of the invention may often be used to effect an adjustment of around 6-7 millimetres in the case of use in building construction, it is entirely feasible to use the adjustment device of the invention for far greater adjustment.

The grooves on the pin are preferably inclined. These may form a screw thread or a series of inclined, parallel grooves on opposing sides of the pin.

The cam element preferably has a projection which enables engagement with the grooves to alter the distance between the cam element and the base.

Preferably, the cam element is designed so that rotation can be effected by an allan key or similar tool.

When the adjustment device of the invention includes biasing means, and especially when the device is inserted in a web of a stud, it is preferred that the adjustment device is supplied on site in a prestressed state. This may be achieved by engaging the cam element with one of the grooves, against the bias provided by the spring. On site, when it is desired to adjust the stud (to make up a minor or major discrepancy in height), the cam can be rotated to engage a groove above or below that of the original engagement, as desired, in order to elevate or lower the stud. Preferably, the device includes a stop which can lock the cam in a desired position. The cam may be rotatable through a narrow arc for this purpose - for example, less than 80°.

In this embodiment, if it is decided on site that a greater height adjustment is required, the device may be designed so that rotation through more than, say, 80°, will release engagement of the cam with the pin. The spring bias will then urge the cam away from the base to take up available height and the cam may then be rotated to engage another groove, to be subsequently locked in the new position. The device of the invention is thus capable of being reset into a different position and so can accommodate a wide range of height adjustments.

Brief Description of the Drawings

The invention in its various aspects will now be described in connection with certain embodiments thereof described in connection with the accompanying drawings. It is to be understood that these embodiments are not intended to be limiting on the scope of the invention.

In the drawings:

Figure 1 is a perspective view of a first embodiment of the adjustment device of the invention, inserted in an embodiment of a building element of the invention, being a stud;

Figure 2 is an exploded view of the adjustment device and stud of Figure 1, showing components;

Figure 3 is an exploded, perspective view of a second embodiment of the adjustment device of the invention, the stud being the same as in Figures 1 and 2;

Figure 4 is a perspective view of a third embodiment of the adjustment device of the invention, inserted in a similar stud to that in the previous Figures and showing the device in the prestressed state;

Figure 5 is a perspective view of the embodiment of Figure 4, with the stud in an elevated position and the device unstressed;

Figure 6 shows in front elevation the adjustment device and lower part of the stud of Figure 4;

Figure 7 is a side elevation of the stud and device of Figure 6;

Figure 8 is a front elevation of the adjustment device and lower part of the stud of Figure 6, with the stud in an elevated position and the device unstressed;

Figure 9 is a side elevation of the stud and device of Figure 8;

Figure 10 shows the adjustment device of Figure 6 without the stud;

Figure 11 is a side elevation of the adjustment device shown in Figure 10;

Figure 12 is a perspective view of the device of Figures 10 and 11;

Figure 13 shows, in perspective view, the stud in Figures 1 to 3, without cut-outs, and also an embodiment of a joining clip for the stud;

Figure 14 shows the stud and joining clip of Figure 13, together with the panel also present in Figure 13, all joined together;

Figure 15 is a cross-sectional view of a second embodiment of the stud of the invention;

Figure 16 is a perspective view of a third embodiment of the building element of the invention, being a mullion, having two webs and first, second and third arms; and

Figure 17 is a similar embodiment to that of Figure 16, but having first, second, third and fourth arms.

Best Modes of Carrying out the Invention

Referring first to Figures 1 and 2, adjustment device 10 is shown with base 12 supporting pin 14 which is upstanding from base 12. Pin 14 has a plurality of grooves 16, which in this case spiral around pin 14 in the form of a screw. Pin 14 also has end stop 18 (refer Figure 2) at the top of pin 14.

Rotatable cam element 20 is adapted to be mounted on pin 14 and has internal protrusions (not shown) which are capable of engaging grooves 16 when cam element 20 is rotated. Rotation of cam element 20 in one direction will cause it to climb up pin 14, while rotation in the reverse direction will cause cam element 20 to descend pin 14.

Cam element 20 has hexagonal opening 22 for insertion of an allan key (not shown) or similar tool to facilitate rotation of cam element 20.

Cam element 20 is made in two parts, 24 and 26. If it is desired to lock cam element 20 on pin 14, this can be achieved via screws 28.

Stud 30 has dual webs 32 and 34. Adjustment device 10 is designed to fit into apertures 36 and 38 formed in webs 32 and 34 respectively and to be rotatable therein.

As will be readily appreciated by one skilled in the art, rotation of cam element 20 on pin 14 will raise or lower stud 30 in relation to base 12, thus adjusting the height of stud 30 in situ as desired.

In the case of the second embodiment in Figure 3, like parts are labelled with like numbers. In the second embodiment, however, pin 14, instead of having spiral screw grooves 16, is flat sided and has inclined grooves 42 on either side.

In this Figure, internal protrusion 40 on cam element 24 is shown. It is this protrusion which engages with inclined grooves 42 when cam element 20 is rotated.

Reference is now made to Figures 4 to 12. Like parts are numbered the same as in Figures 1 to 3. Adjustment device 10 differs to that in Figure 3 in that it includes spring 44. Spring 44 is attached, at its upper end, to stud 30 by clip 46. The lower end of spring 44 rests on base 12. Spring 44 biases cam element 20 (and hence stud 30) away from base 12.

In the configuration shown in Figure 4, spring 44 has been compressed and is held in that position by engagement of one of grooves 42 by protrusion 40 (not visible in these Figures, but refer Figure 3). When an allen key or other suitable tool (not shown) is inserted in hexagonal opening 22, and rotated, protrusion 40 engages a groove 42, causing cam element 20 and hence stud 30 to change in distance from base 12. If cam element 20 is rotated in the direction shown by arrow 48, the distance increases. Reverse rotation decreases the distance.

In this embodiment, an internal stop 51 (refer Figure 12) (indicated externally by rivet 50) limits rotation in the direction of arrow 48 beyond about 80°. If at this stage further adjustment is required, rotation of cam element 20 in the direction opposite to that of arrow 48 will enable protrusion 40 to clear all grooves 42 and pin 14 is released from engagement with cam element 20. Spring 44 causes cam element 20 and stud 30 to elevate to the maximum allowable (determined by any horizontal surface above stud 30 and/or the length of spring 44 when unstressed). Rotation of cam element 20 in the direction of arrow 48 then causes protrusion 40 to engage a groove 42, to secure stud 30 in the desired position, under tension.

So that cam element 20 may be released from engagement with grooves 42 in pin 14, protrusion 40 (Figure 3) is deliberately formed so as to leave a gap 41 within cam element 20. Gap 41 is sized to allow pin 14 to pass through cam element 20 when protrusion 40 is not in engagement with a groove 42.

It is to be understood that, in any of the embodiments described, parts 24 and 26 of cam element 20 may be attached one to the other in any suitable way, including by pop riveting.

Referring next to Figures 13 and 14, stud 110 has channels 112 arranged in two sets of three. Each channel 112 has a base, 113. Each set of channels 112 is separated from the other by parallel webs 136 and 138 which include reinforcing ribs 140.

Joining clip 116 is made of two parts, clip carrier 115 and clip 117. Clip carrier 115 is adapted to be attached by a screw or nail inserted between parts 120 and 121 through groove 131 into panel 118. Parts 120 and 121 on clip carrier 115 are adapted to push or slide into C-shaped channel 119 on clip 117.

Clip 117 has co-operating means comprising resilient arms 114a and 114b which can be forward fitted into one of channels 112. Arms 114a and 114b carry grooves

or serrations 126 which can lock into corresponding grooves 130 in the side walls of channel 112.

Stud 110 includes further grooves 132 to reduce mass as well as screw locating grooves 134.

The walls of channels 112 may be bifurcated to include large grooves 142 to assist in reducing mass.

As already indicated, it is contemplated that clip carrier 115 will be attached to panel 118 at the factory, transported to the site and there mated with clip 117 which in turn is then fitted into channel 112 of stud 110.

Turning now to Figure 15, stud 150 is similar to stud 110 and more clearly illustrates grooves 130, 132 and 142. It will be noted, however, that stud 150 omits reinforcing ribs 140. Otherwise, stud 150 is very similar to stud 110.

In Figures 16 and Figure 17, it can be seen that each arm of building element 190 is joined to a corresponding arm by webs 136 and 138.

Industrial Applicability

The adjustment device of the invention provides a convenient and efficient means to adjust the height of an element. It has ready application in the building industry, where it can provide adjustment for shortcomings in alignment or manufacture of studs, for example. It can enable the use of studs, for example, with a significant difference in height, in the same location. It can be used to level furniture and appliances, inter alia.

The building element being a stud or mullion permits the use of screws or other penetrating articles without compromising the strength of the stud or mullion.

The building element being the joining clip streamlines integration of the clip with panels, for example, and facilitates the construction of buildings and furniture.

Claims

1. An adjustment device which includes:

   a base;

   a pin upstanding from the base and being supported by the base, the pin having a plurality of grooves; and

   a rotatable cam element capable of engaging one or more of the grooves to alter the distance between the base and the cam element.

2. The device of claim 1, which further includes means for biasing the cam element with respect to the base.

3. The device of claim 2, wherein the biasing means includes a spring which biases the cam element away from the base.

4. The device of any of one of claims 1 to 3, wherein the grooves are inclined.

5. The device of claim 4, wherein the grooves form a screw thread.

6. The device of claim 4, wherein the grooves are parallel, the pin has opposing sides and the one set of grooves is located on one of the sides of the pin and a second set of grooves is located on the opposing side of the pin.

7. The device of any one of claims 1 to 6, wherein the cam element has a projection adapted to engage one or more of the grooves to alter the distance between the cam element and the base.

8. The device of claim 7, wherein the projection is adapted to permit the pin to pass through the cam element when none of the grooves is engaged.

9. The device of any one of claims 1 to 8, wherein the cam element includes an aperture adapted to receive a tool to facilitate rotation of the cam element.

10. A building element suitable for use as a stud or mullion, the building element including a first set of channels and a second set of channels, each channel in each set being adapted to receive a co-operating means for the purpose of mounting a panel or bracket on the building element, the first set of channels being parallel to and spaced from the second set of channels, characterised in that the first set of channels is spaced from the second set of channels by first and second webs, the first web being parallel to and spaced from the second web.

11. The building element of claim 10, in which there are three channels in each set of channels.

12. The building element of claim 10 or 11, in which the building element has a first arm and a second arm, the first arm being at an angle to the second, each arm including the first set of channels, the second set of channels and the first and second webs.

13. The building element of claim 12, wherein the angle between the first and second arms is 90°.

14. The building element of claim 12, which has more than two arms.

15. The building element of claim 14, where there are three arms and the building element forms a T shape.

16. The building element of claim 14, wherein there are four arms and the building element forms a cruciform shape.

17. The building element of claim 14, wherein the arms lie in more than one plane.

18. The adjustment device of any one of claims 1 to 9 inserted in the building element of any one of claims 10 to 17.

19. A building element being a joining clip adapted to mount a panel or bracket to the building element of any one of claims 10 to 17, the joining clip including the co-operating means and also including means for connecting the joining clip to the panel or bracket, the co-operating means including a pair of resilient arms, characterised in that the joining clip has a first part which includes the means for connecting the joining clip to the panel or bracket and a second part which includes the pair of resilient arms, the first part being adapted to mate with the second part.

20. The building element of claim 19, wherein the first part has a protrusion adapted to snap into or slide into a channel on the second part.

21. The building element of claim 19, wherein the second part has a protrusion adapted to snap into or slide into a channel on the first part.

22. The building element of any one of claims 19 to 21, wherein the first and second parts are made of relatively resilient material, to assist in mating one with the other.

23. The building element of any one of claims 19 to 22, when the building element also functions as an internal drain or a seal.

24. The building element of claim 19, wherein the building element is made of a rigid material.

25. The building element of claim 24, wherein the building element is made of stainless steel.

26. The building element of claim 19, wherein the resilient arms included in the co-operating means contain grooves adapted to complement grooves in walls of the channels.

27. An adjustment device substantially as herein described with reference to the Figures 1 and 2 or 3 or 4 to 12 of the accompanying drawings.

28. A building element suitable for use as a stud or mullion substantially as herein described with reference to Figures 1 to 3 or 4 to 12 or 13 and 14 or 15 or 16 or 17 of the accompanying drawings.

29. A building element being a joining clip substantially as herein described with reference to Figures 13 and 14 of the accompanying drawings.

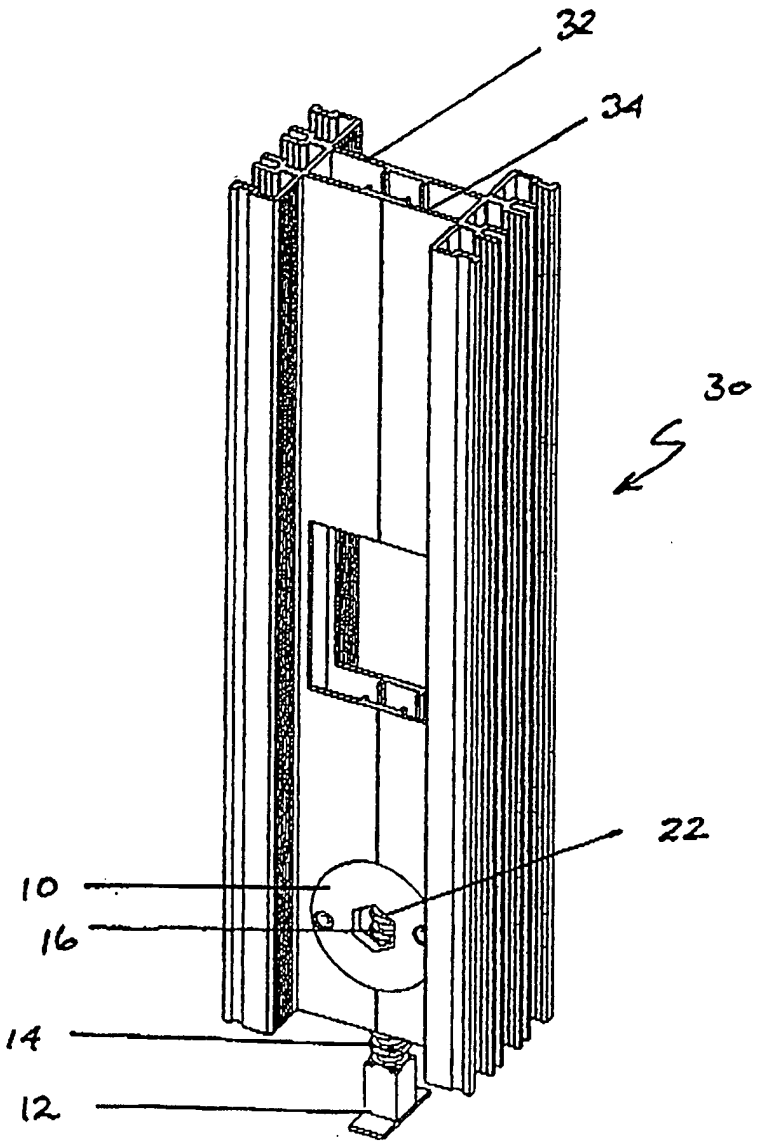


Figure 1

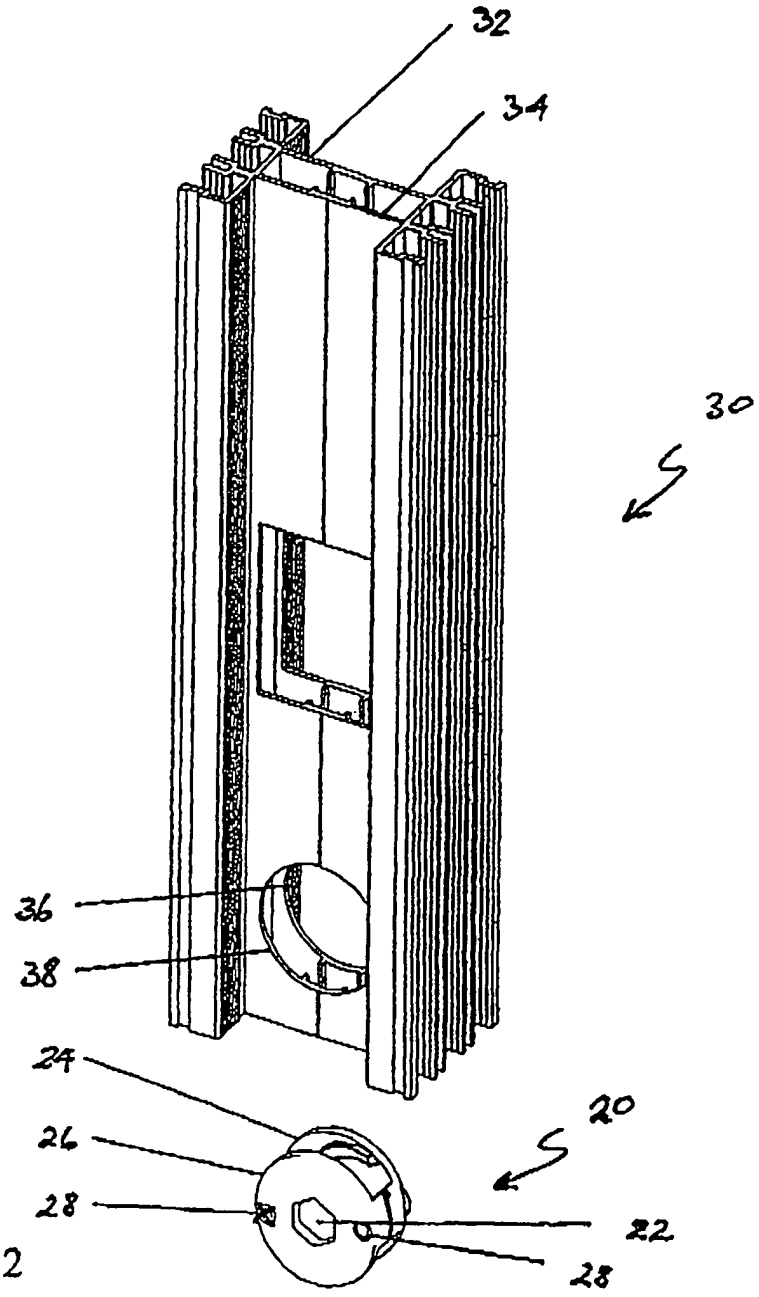
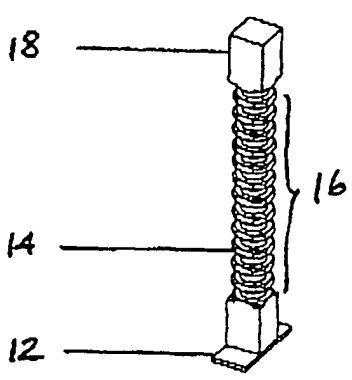


Figure 2



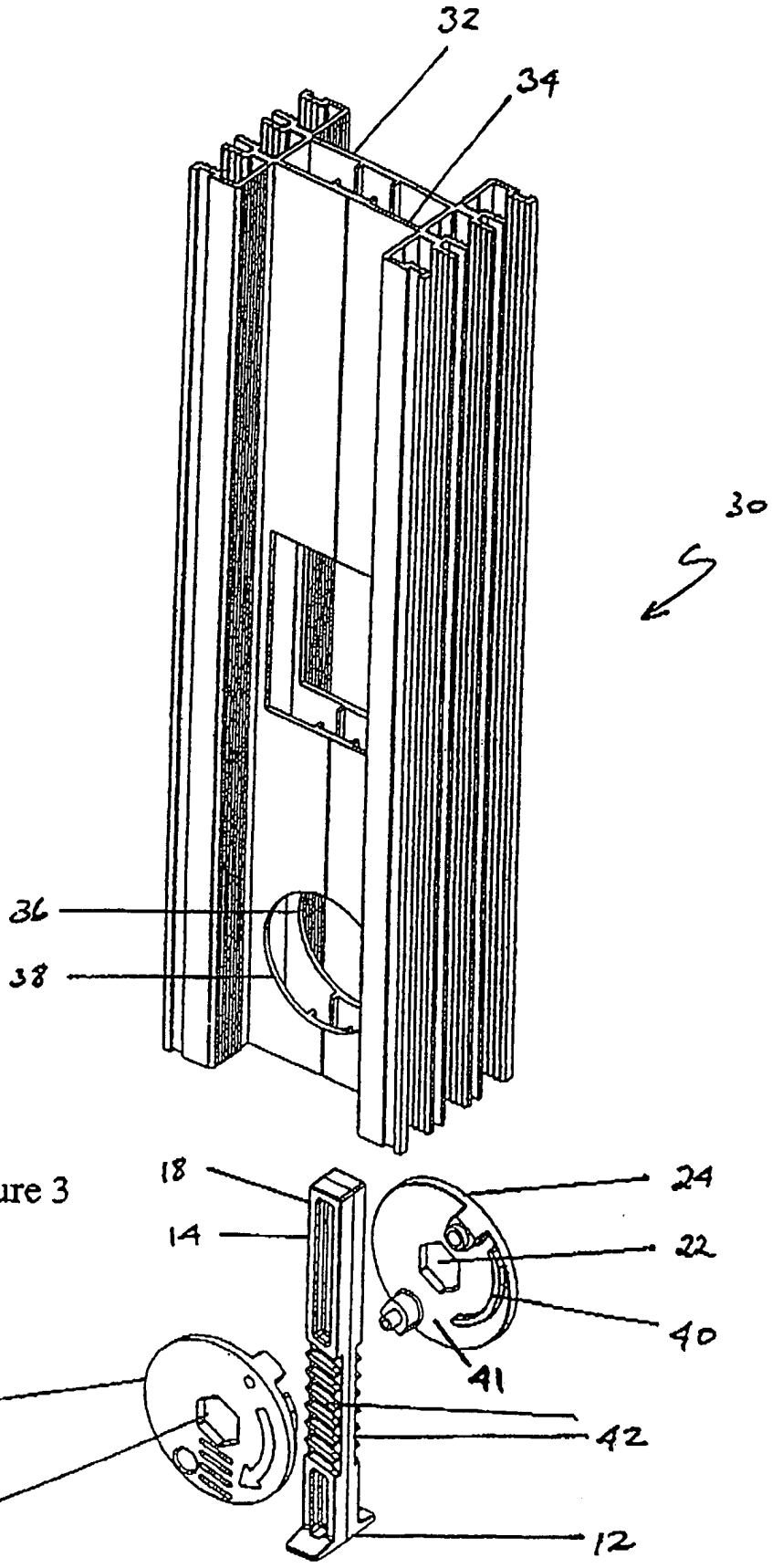


Figure 3

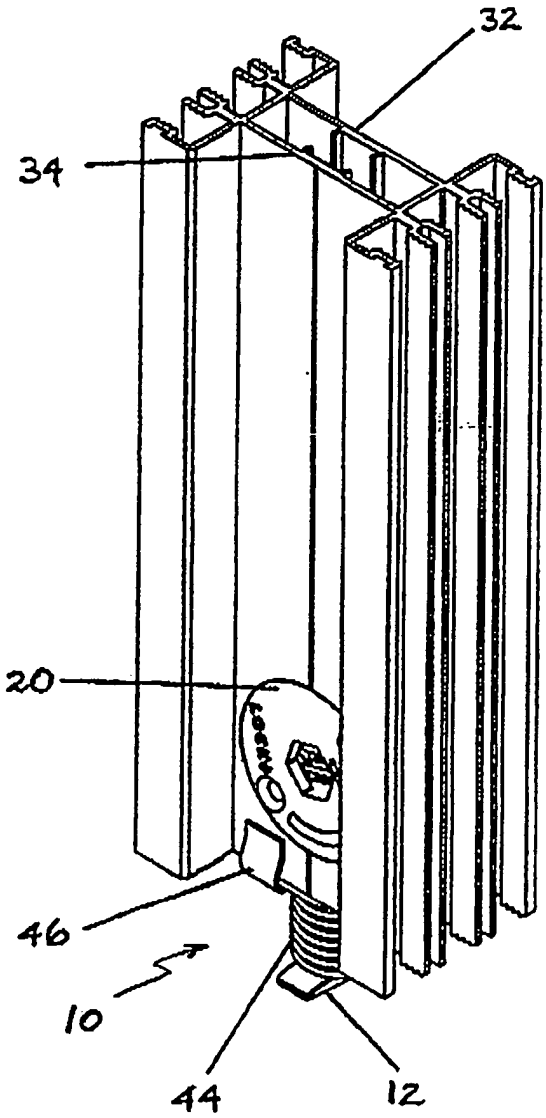


Figure 4

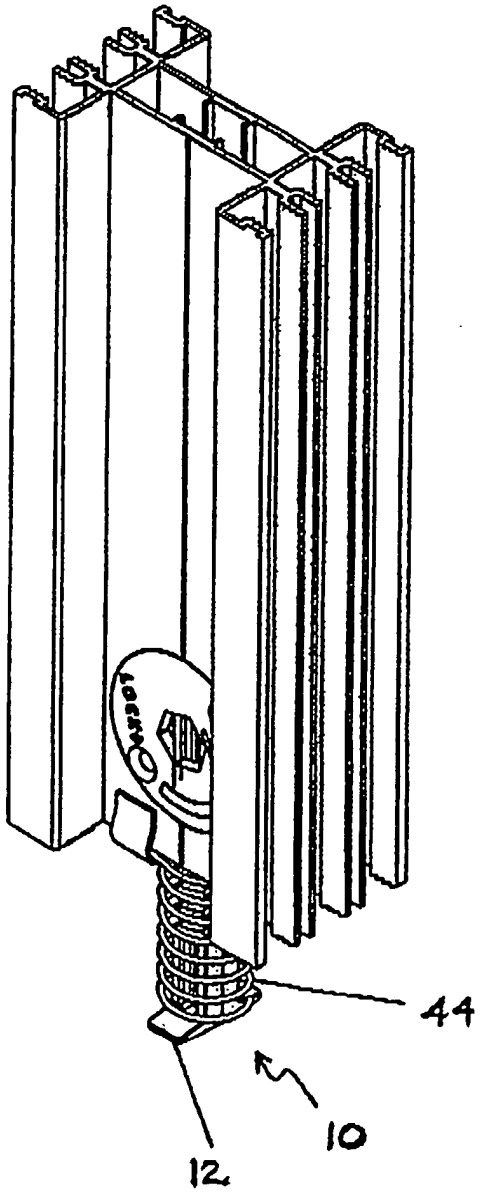


Figure 5

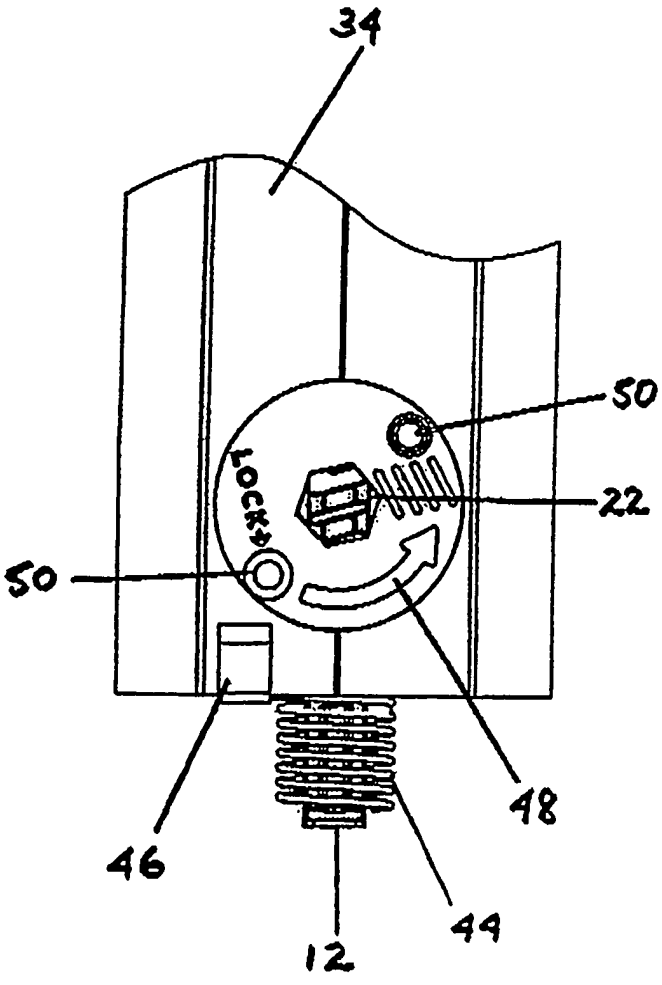


Figure 6

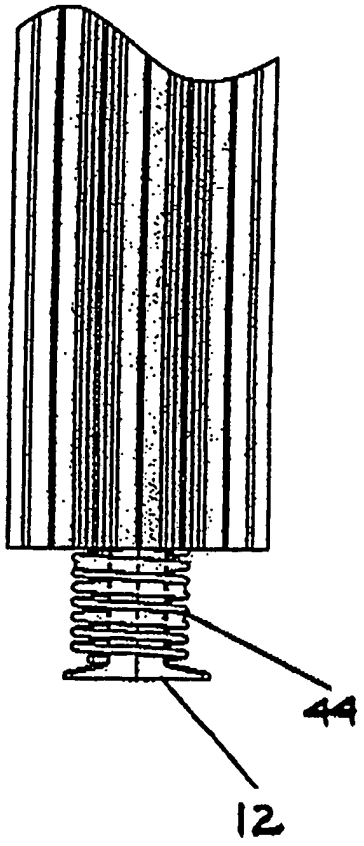


Figure 7

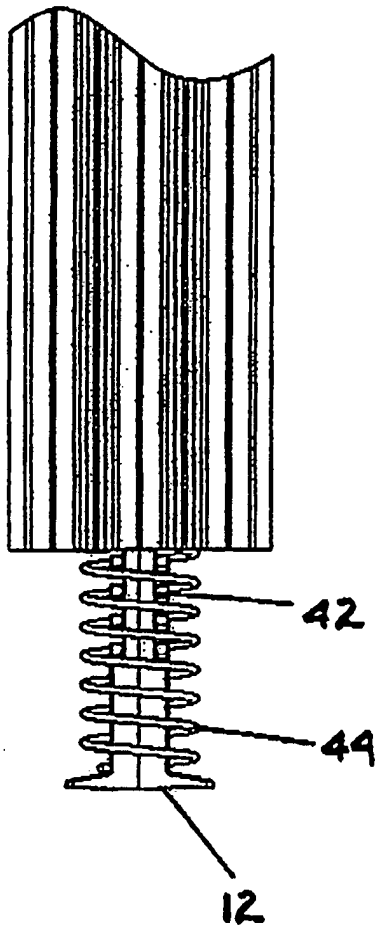


Figure 8

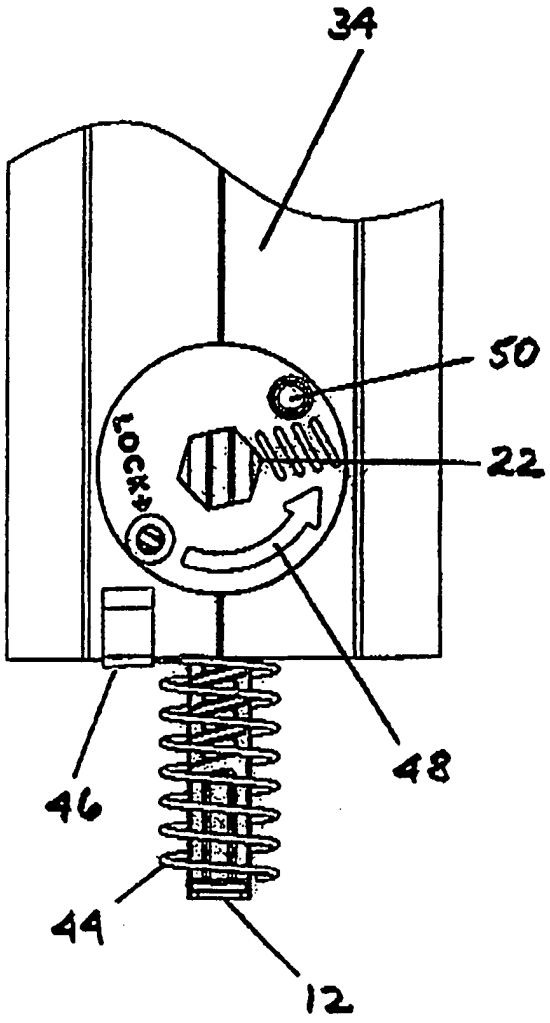


Figure 9

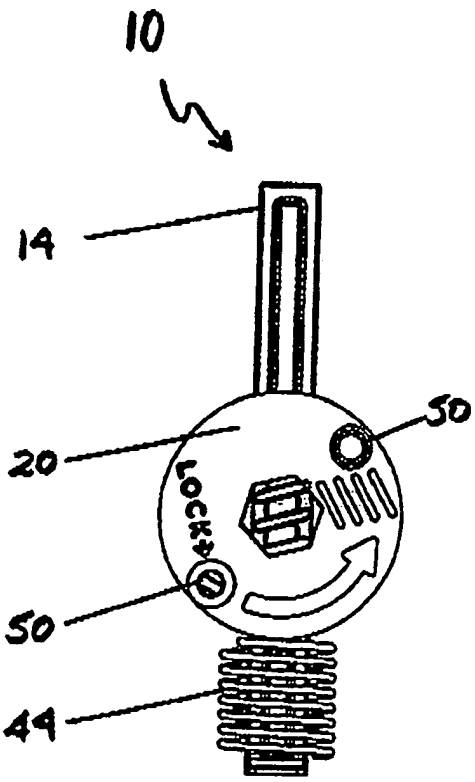


Figure 10

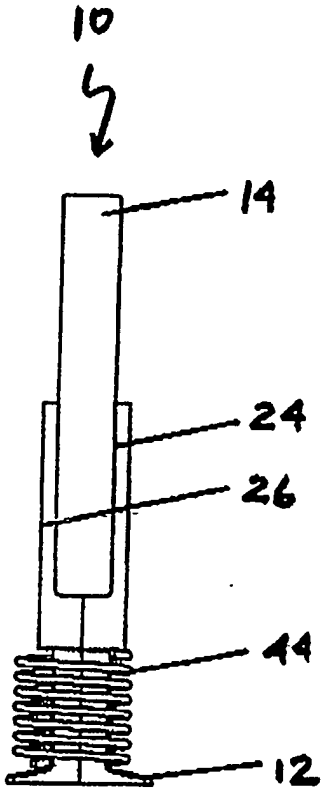
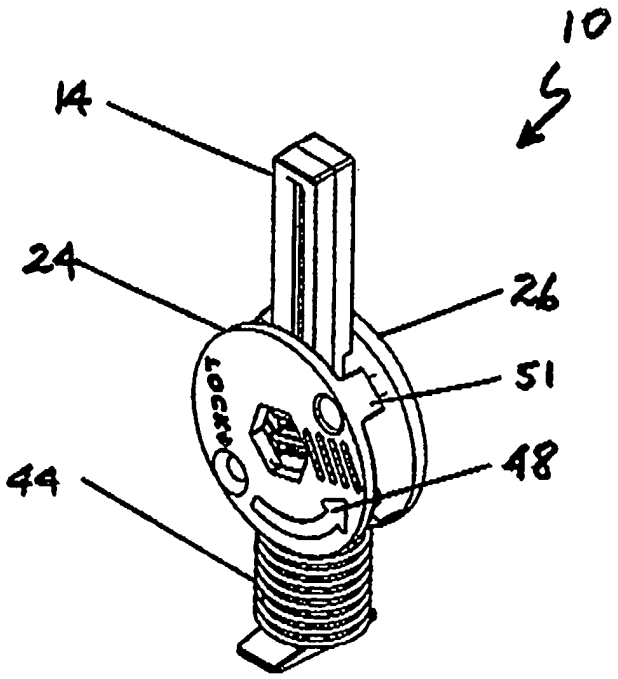


Figure 11

Figure 12



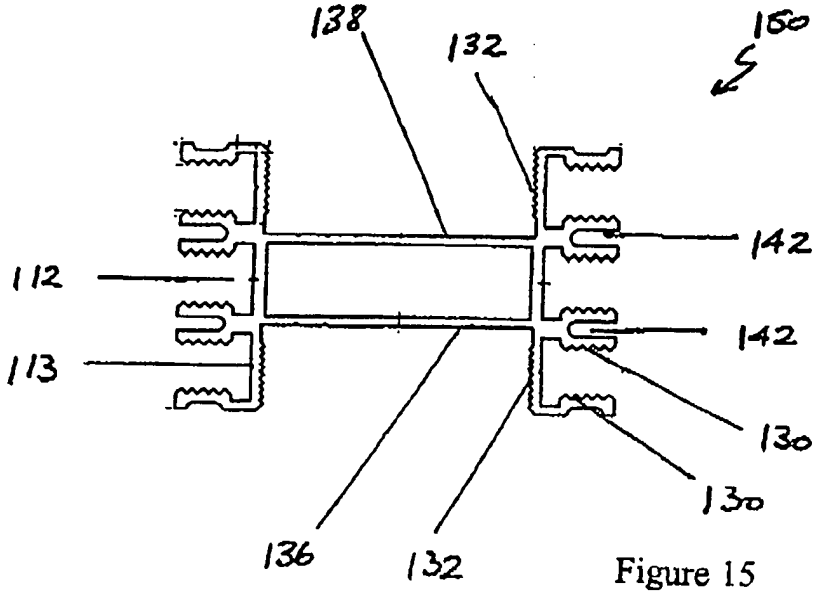


Figure 15

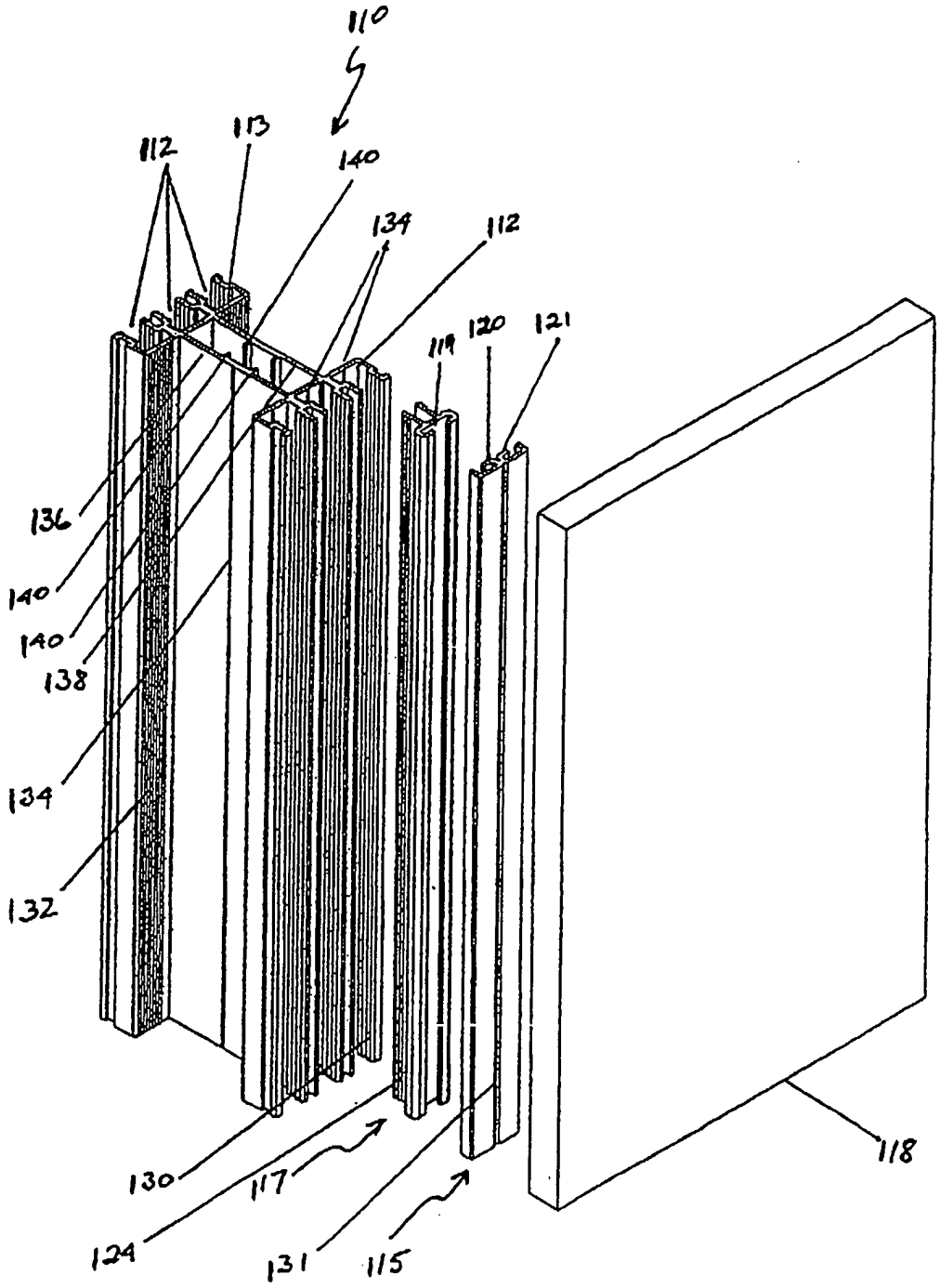

110
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Figure 13

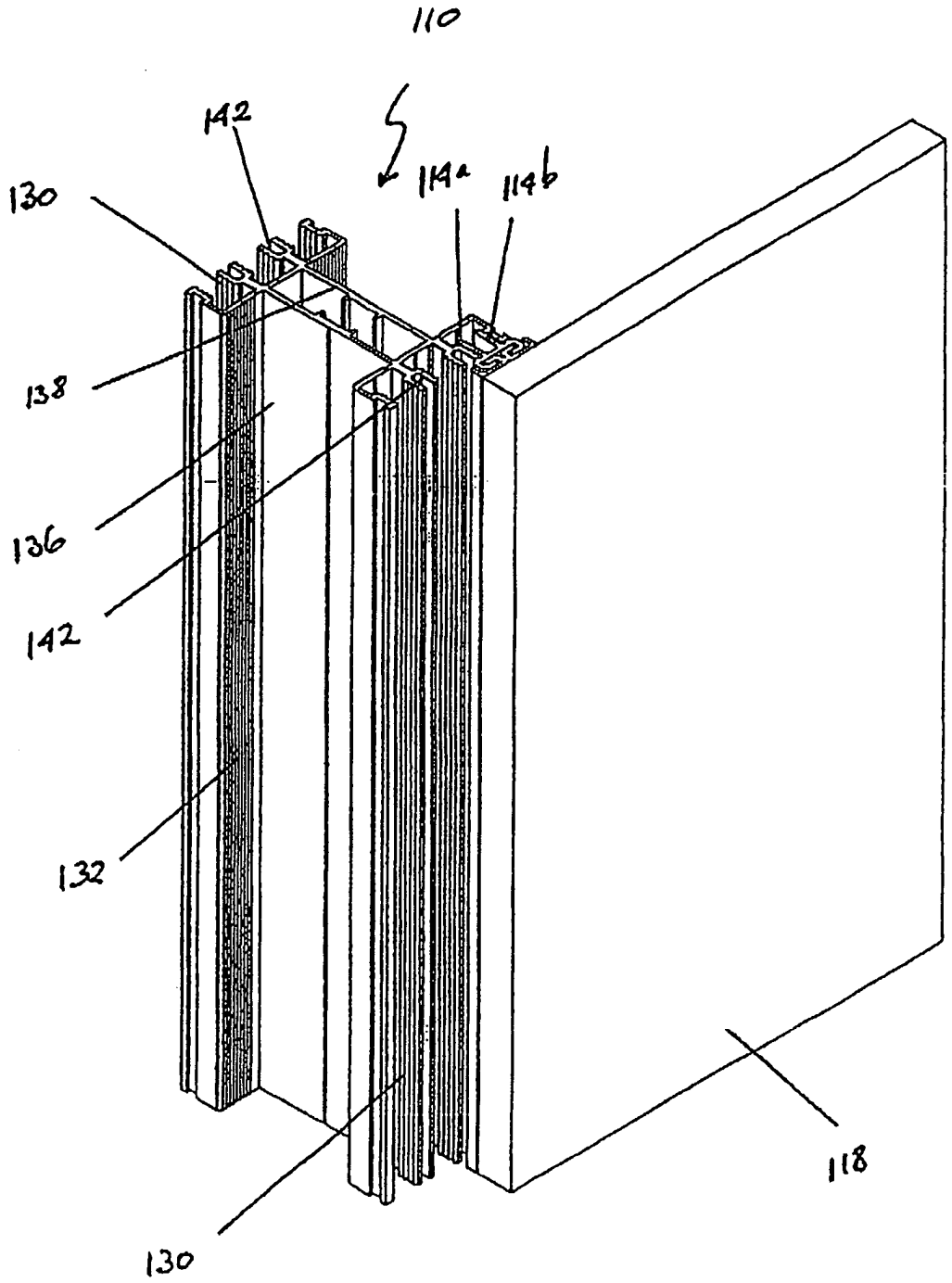

Figure 14

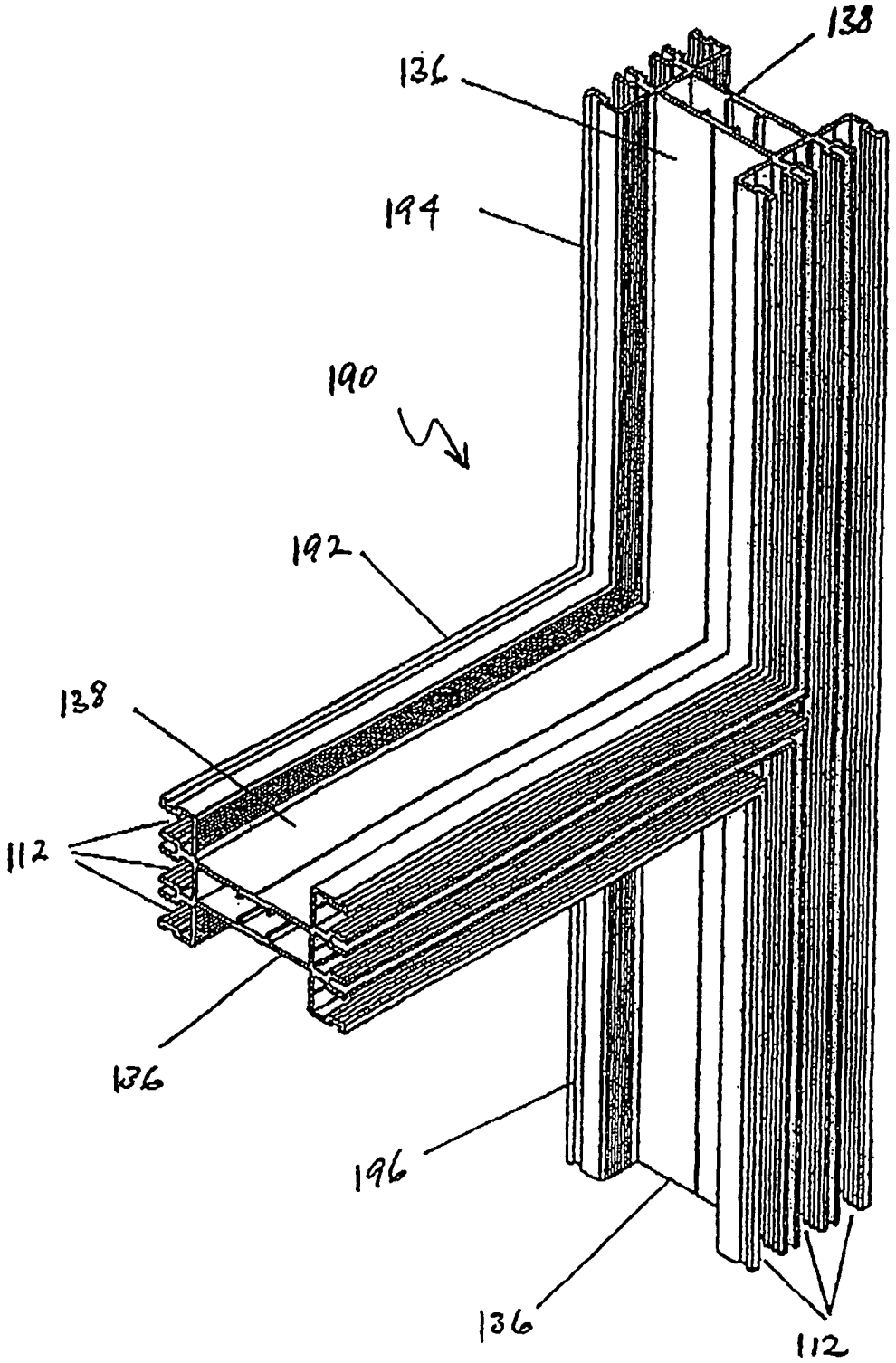

Figure 16

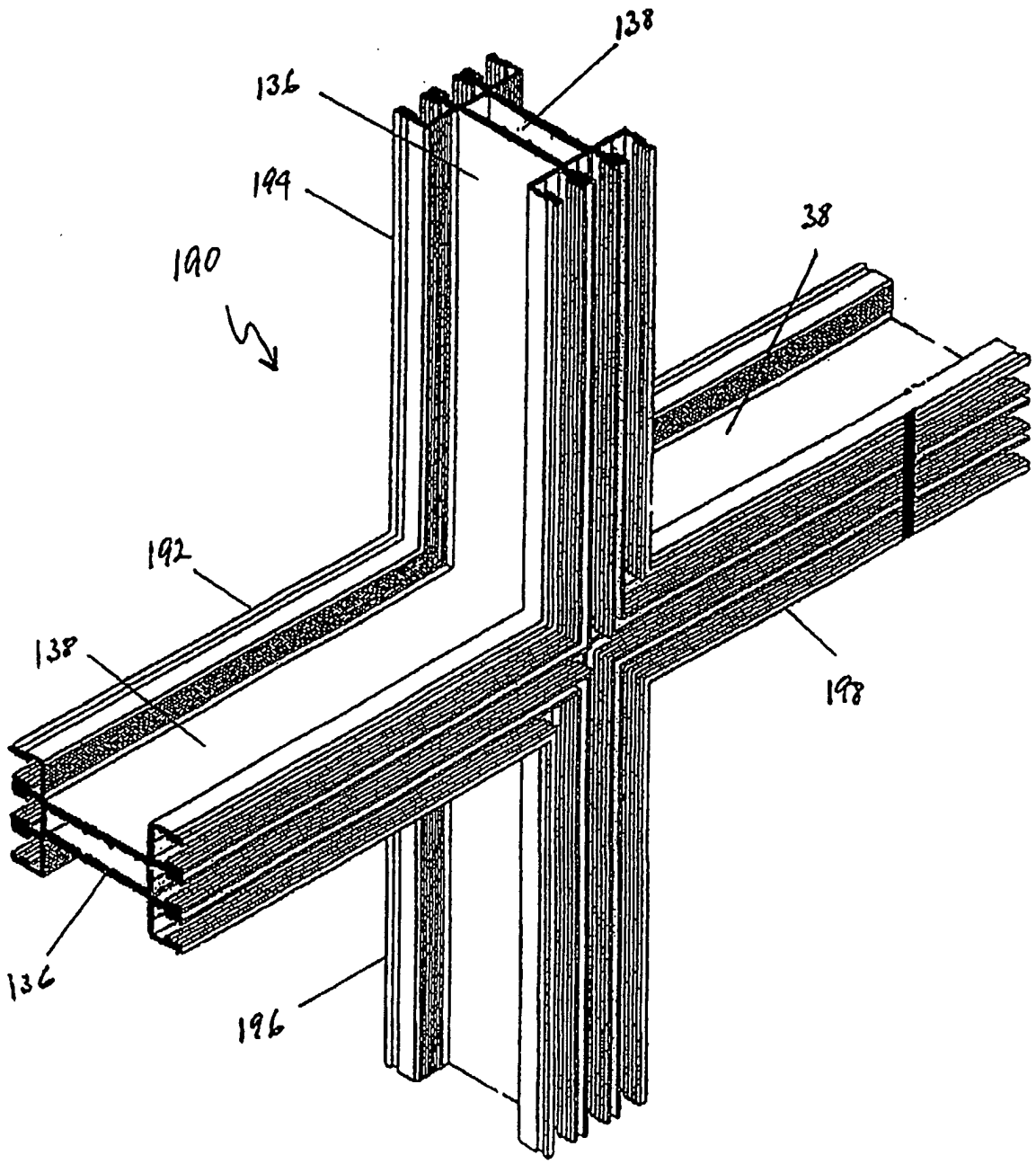

Figure 17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU02/00747

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: E04B 2/78 B66F 3/18 A47B 91/00 E04B 1/58 E04B 9/26 E04C 3/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: CAPRI E04B 2/76 B66F 3/16, 3/18 E04G 23/00, 23/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

AU IPC: E04B 1/58, 2/56-2/62, 2/74-2/96, 9/24-9/26 E04G 23/00 B66F 3/08, 3/16, 3/18 E04C 3/30, 3/32 F16S 3/02

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI JAPIO: adjust jack lift hoist elevate raise lower cam pinion ratchet gear groove thread notch rack stud mullion pole post upright partition fridge table furniture rotate turn twist wind wound

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 323158 A (LUBBE) 16 July 1920 Figures	1, 4, 5, 7, 9
X	EP 393473 B1 (GIOVANNETTI) 29 September 1993 Page 3 lines 7 to 31, claims, figures	1 to 9
X	WO 01/16013 A1 (E.A. STORZ GMBH & CO. KG) 8 March 2001 Abstract and figures	1, 4, 5, 7, 9

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 July 2002	21 AUG 2002

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU02/00747

C (Continuation). **DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 843571 A (ROWE INDUSTRIES (KIRBY) LIMITED) 4 August 1960	1
A	AU 1198/66 (402784) B (HOLZAEPFEL et al) 3 August 1967	1
A	GB 1504989 A (WESTINGHOUSE ELECTRIC CORPORATION) 22 March 1978	1
X	AU 86748/75 A (PROFILE ET TUBES DE L'EST AND CENTRE DE RECHERCHE D'ARCHITECTURE D'URBANISME ET DE CONSTRUCTION RAUC) 26 May 1977 Figures 3, 4, 14 to 16	10, 12-18
X	AU 77023/81 A (KWIKFORM LTD) 12 May 1983 Figures	10
X	AU 62622/90 A (LOGAN UNITS (AUSTRALIA) PTY LTD) 28 March 1991 Figure 2	10
X	EP 600545 B1 (HYDRO ALUMINIUM SYSTEMS S.p.A) 12 May 1999 Figures 1, 2, 19 to 23	10-18
X	WO 95/27834 A1 (MAMANE) 19 October 1985 Figures 1 and 2	10-18
X	WO 00/37846 A1 (ULTRA-FRAME (UK) LIMITED) 29 June 2000 Entire document	10, 11
X	US 3686810 A (ALLEN) 29 August 1972 Entire document	19-26
A	FR 2240327 A (COMPTEURS SCHLUMBERGER) 7 March 1975 Figure 2	19-26
A	GB 2322646 A (KOMFORT SYSTEMS LIMITED) 2 September 1998	19-26

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU02/00747

C (Continuation) **DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5996299 A (HSUEH) 7 December 1999 Figures	19 to 26
X	WO 98/16699 A1 (RUDDUCK) 23 April 1998 Figures 8, 13, 14, 19, 20	19-26
A	WO 00/29688 A1 (COSELEY PANEL PRODUCTS LIMITED) 25 May 2000	19-26

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU02/00747

Box I **Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos :

because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos :

because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos :

because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II **Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

See supplemental Box I

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.